



09/386734

Co/c

Attorney Docket No.: 291958170US

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By: Melody J. Almberg
Melody J. Almberg

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: THOMAS L. RITZDORF *et al.*

PATENT NO.: 7,001,471

ISSUED: FEBRUARY 21, 2006

FOR: **METHOD AND APPARATUS FOR LOW-TEMPERATURE ANNEALING OF METALLIZATION MICROSTRUCTURES IN THE PRODUCTION OF A MICROELECTRONIC DEVICE**

EXAMINER: GEORGE WYSZOMIERSKI

ART UNIT: 1742

CONF. NO.: 1735

Certificate
APR 14 2006
of Correction

Request for Certificate of Correction
under 37 C.F.R. §1.322 or §1.323

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. The applicant(s) requests a Certificate of Correction to correct errors in the above-identified patent, which are listed on the enclosed Form PTO/SB/44.
2. Any errors on the part of the applicant are of a clerical or typographical nature or are otherwise minor in character. None of the requested corrections would constitute new matter or require reexamination of the patent.
3. Source of Error(s) and Payment of Fee:

- ☒ All of the errors listed on Form PTO/SB/44 are believed to be due to mistake on the part of the USPTO (37 C.F.R. §1.322). Accordingly, no fees are believed to be due.
- ☐ At least one of the errors occurred due to applicant's mistake made in good faith (37 C.F.R. §1.323).
- ☐ A check covering the fee under 37 C.F.R. §1.20(a) (\$100.00) is enclosed herewith.

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- ☐ Please charge the fee under 37 C.F.R. §1.20(a) to Deposit Account No. 50-0665. This paper is provided in triplicate.
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4. Please send the Certificate of Correction to the undersigned at the address shown below.

Respectfully submitted,
Perkins Coie LLP

Date: 7 Apr. 1 2006

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO : 7,001,471

DATED : February 21, 2006

INVENTOR(S) : Thomas L. Ritzdorf et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Front Page

References cited, Please insert the following Information Disclosure Statements allowed by the Examiner on 12/17/01:

--Mak, C.Y., "Electroless Copper Deposition on Metals and Metal Silicides," Materials Research Society Bulletin, (August 1994).

Hogan, B.M., "Microstructural Stability of Copper Electroplate," (citation unknown but believed to be published more than one year before the date of this application).

Stoychev, D., Vitanova, I. Vieweger, U., "Influence of the Inclusions in Thick Copper Coatings or Their Physico-Mechanical Properties," CHECK REFERENCES

Stoychev, D.S., and Aroyo, M.S., "The Influence of Pulse Frequency on the Hardness of Bright Copper Electrodeposits," *Plating & Surface Finishing*, pp. 26-28 (date unknown but believed to be published more than one year before the date of this patent application).

Stoychev, D.S., and Aroyo, m.S., 'On the Influence of Pulse Frequency on the Hardness of Bright Copper Electrodeposits, (citation unknown but believed to be published more than one year before the date of this patent application).

Stein, B., "A Practical Guide to Understanding, Measuring and Controlling Stress in Electroformed Metals," presented at the AESF Electroforming Symposium, Las Vegas, NV (March 1996).

Sanchez, J. Jr., Besser, P.R., and Field, D.P., "Microstructure of Damascene Processed AlCu Interconnects for Integrated Circuit Applications," presented at the Fourth International Workshop on Stress Induced Phenomena in Metallizations, Tokyo, Japan (June 1997).

Sanchez, J. Jr. and Besser, P.R., "Modelling Microstructure Development in Trench-Interconnect Structures," submitted to International Interconnect Technology Conference, Sunnyvale, CA (June 1998).

Field, D.P., Sanchez, J. Jr., Besser, P.R., Dingley, D.J., "Analysis of Grain-Boundary Structure in Al-Cu Interconnects," *J. Appl. Phys.*, 82(5) (September 1, 1997).

Gupta, D., "Comparative Cu Diffusion Studies in Advanced Metallizations of Cu and Al-Cu Based Third Films," Materials Research Society Symposium Proceedings, San Francisco, CA (April 1994).

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Front Page, continued from page 1

Megaw, H.D., and Stokes, A.R., "Breadths of X-Ray Diffraction Lines and Mechanical Properties of Some Cold-Worked Metals," *J. Inst. Metals*, vol. LXXI, pp. 279-289 (1944)

Thompson, C.V., and Knowlton, B.D., "Designing Circuits and Processes to Optimize Performance and Reliability: Metallurgy Meets Tcad," *Microelectronics and Reliability*, 36, P. 1683 (1996).

Carel, R., Thompson, C.V., Frost, H.J., *Material Research Society Symposium*, Vol. 343, Materials Research Society (1994).

Floro, J.A., Carel, R. and Thompson, C.V., "Energy Minimization During Epitaxial Grain Growth Strain vs. Interfacial Energy," *Material Research Society Symposium*, Vol. 317, Materials Research Society, (1994).

Plötnner, M., Urbansky, N., Preusz, A. and Wenzel, C., "Control of Mechanical Stresses and their Temperature Dependence in PVD CU Films," presented at Adv. Metalliz. & Interconn. Syst. ULSI Applic. San Diego (1997).

Wong, Chee. C., Smith, H.I., and Thompson, C.V., "Secondary Grain Growth and Graphoepitaxy in Thin Au Films on Submicrometer-Period Gratings," *Material Research Society Symposium Proc.*, Vol. 47, Materials Research Society (1985).

Thompson, C.V., and Smith, H.I., "Secondary Grain Growth in Thin Films." *Material Research Society Symposium Proc.*, Vol. 57, Materials Research Society (1987).

Wong, C.C., Smith, H.I., and Thompson, C.V., "Room Temperature Grain Growth in Thin Au Films," from *Grain Boundary Structure and Related Phenomena*, supplement to *Transactions of Japanese Institute of Metals*, 27, p. 641 (1986).

Thompson, C.V., "Observations of Grain Growth in Thin Films," from *Microstructural Science for Thin Film Metalizations in Electronics Applications*, eds. J. Sanchez, D.A. Smith and N. DeLanerolle, The Minerals, Metals & Materials Society (1988).

Frost, H.J., Thompson, C.V., and Walton, D.T., "Abnormal Grain Growth in Thin Films Due to Anisotropy of Free-Surface Energies," *Materials Science Forum*, Vols. 94-96, pp. 543-550, Trans Tech Publications, Switzerland (1992).

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(Also Form PTO-1050)

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Frost, H.J., Thompson, C.V., "Microstructural Evolution in Thin Films," presented at the Symposium on Computer Simulation of Microstructural Evolution, Toronto, Canada, October 15 (1985).

Frost, H.J., Thompson, C.V., and Walton, D.T., "Grain Growth Stagnation and Abnormal Grain Growth in Thin Films," presented at TMS-AIME Fall Meeting, Indianapolis, IN (1989).

Reed-Hall, et al., "Physical Metallurgy Principles," pp. 270, 287 and 287, 83rd Ed. (1991).

Stoychev, D.S., and Aroyo, M.S., "On the Influence of Pulse Frequency upon the Hardness of Bright Copper Electrodeposits," (citation unknown but believed to be published more than one year before the date of this patent application).

Frost, H.J. and Thompson, C.V., "Modeling of Optical Thin Films," reprint from Proceedings of SPIE (International Society for Optical Engineering, San Diego, CA 1987, printed by the Society of Photo-Optical Instrumentation Engineers (1988).

Walton, D.T., Frost, H.J. and Thompson, C.V., "Computer Simulation of Grain Growth in Thin Film Interconnect Lines," Mat. Res. Soc. Symp. Proc., vol. 225 (1991).--

Column 3

Line 61, delete "disclosed method.";

Column 17

Line 62, "microstructues" should be --microstructures--;

Column 20

Line 57, "topper" should be --copper--;

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